

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION
IRRIGATION WATER CONVEYANCE, STEEL PIPELINE**

(ft)
CODE 430FF

1. INSTALLATION

- a. Buried pipelines.** Pipe shall be laid to the lines and grades as shown on the drawings and/or as staked in the field and shall be placed deep enough below the land surface to protect it from the hazards imposed by traffic crossings, farm operations, freezing temperatures, or soil cracking. The cover shall be a minimum of 2 feet., but in soils susceptible to deep cracking, the cover shall be a minimum of 3 feet. If necessary to install the pipe at a lesser depth, adequate protection shall be provided by placing extra fill over the pipeline, constructing a fence or other surface barriers, or using extra heavy gage pipe.

If trenches are excavated in soils containing rock or other hard material that might damage the pipe or coating material, the trenches shall be excavated slightly deeper than required and then filled to grade with sand or fine earth.

Coated pipe shall be handled in a manner to prevent abrasion of the coating during transportation, placement, and backfilling. Pipe shall not be dropped from cars or trucks or allowed to roll down skids without proper restraining ropes. Each section of pipe shall be delivered in the field as near as practicable to the place where it is to be installed. When stockpiled, it shall be neatly piled and blocked with strips between tiers. If the pipe must be moved longitudinally along the trench, care shall be taken to insure that the pipe and the coating are not damaged. Pipe shall not be rolled or dragged on the ground. If the pipe is supported, as for welding, supports shall be of sufficient width and number and be padded, if necessary, to prevent damage to the coating.

- b. Joints and connections.** Special field joints shall be installed according to the

manufacturer's recommendations. On buried pipelines, high-resistance joints between pipe lengths shall be electrically bridged with a welded, brazed, or soldered copper wire not smaller than 4/0 gage in size. If coated pipe is field welded, special care shall be taken to avoid burning the protective coating. After the joints are welded, they shall be covered with a coating equal in quality to that specified for the pipe. Dielectric connections shall be placed as specified on the drawings.

- c. Above ground pipelines.** Concrete, timber, or other pipe supports, and anchor and thrust blocks shall be constructed at the locations to the dimensions shown on the drawings and/or as staked in the field. Saddles shall be shaped to firmly support the pipe throughout the full arc of contact. At least two layers of 30# felt strips shall be placed between the pipe and its support. The felt shall cover the entire area of contact between the pipe and the saddle. A graphite lubricant shall be placed between the felt strips before the pipe is placed in the saddle.

- d. On ground pipelines.** Pipe shall be laid to the lines and grades shown on the drawings and/or as staked in the field and shall be placed so that it is protected from the hazards imposed by traffic crossings, farm operations, or other hazards. The ground shall be shaped so as to provide support needed. If there are rocks or objects that might damage the pipe coating, sand or soil shall be used as a base for the pipe.

Concrete, timber, or other anchors and thrust blocks shall be constructed at the locations to the dimensions shown on the drawings or as staked in the field, or both.

- e. Paint.** Unless otherwise specified, all aboveground and

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onground pipelines shall be painted as follows:

All grease and oil shall be removed from the pipe surface by steam cleaning or by solvent cleaning. All dirt, surface rust, and loose scale shall be removed by wire brushing, flame cleaning, use of rotary abrading tools, or light sand blasting.

To the cleaned pipe there shall be applied one priming coat or red lead base paint conforming to the requirements of Federal Specification TT-P-86e, Types I, II, or III, or one priming coat of synthetic primer conforming to the requirements of Federal Specification TT-P-636c(1).

The painting shall be completed by applying two coats of aluminum paint. The aluminum paint shall be prepared by mixing aluminum paste conforming to Federal Specification TT-P-320b(1), Type II, Class B with mixing varnish conforming to the requirements of Federal Specification TT-V-81d, Type II, Class B at the rate of 2 pounds of aluminum paste per gallon of varnish. The paint shall be mixed at the time of use.

f. Coating. Coating material and application procedures shall be as detailed in the specifications indicated under "Materials" by close of coating.

g. Cathodic protection. Buried steel pipelines shall be protected with sacrificial galvanic anodes if they are specified to supplement the protection provided by the pipe coating. The anodes shall be of the kind and number specified for the job or as shown on the drawings, or both. Anode materials shall be as specified under "Materials".

Anodes shall be placed as shown on the drawings. If horizontally placed, anodes shall be at or below the bottom elevation of the pipeline. Vertically placed anodes shall have a minimum distance of 3 feet between the ground surface and the top of the anode. Anodes shall not be placed in fill areas, and magnesium anodes must be placed a minimum distance of 10 feet from the pipeline.

Anodes shall be bedded in moist fine clay, clay loam, silt, or silt loam. In sandy and

gravelly areas, fine material must be imported for bedding and for covering the anodes to a depth of 6 in. The packaged anodes and the fine textured soil used for bedding and backfill shall be thoroughly wetted.

The lead wire from the anode, or the header wire for multiple anode installations, shall be attached to the pipeline by cadwelding, thermowelding, or other similar processes. The area of damaged pipe coating and the weld shall then be covered with a coating equal in quality to that of the specified original pipe coating.

Testing station facilities shall be located and installed as specified for the job or as shown on the drawings, or both. Wires at testing stations shall be attached to the pipe by one of the processes specified for anode lead wires.

h. Testing. Underground steel pipelines shall be tested before placing the backfill over the field joints. Aboveground steel pipelines may be tested at any time after they are ready for operation.

The pipeline shall be filled with water, taking care to bleed air and prevent water hammer. When the line is full, all valves shall be closed, and the line shall be brought up to full design working pressure. All joints shall then be carefully inspected for leakage, and any visible leaks shall be repaired.

It shall be demonstrated by testing that all valves, vents, surge chambers, and other appurtenances function properly when the pipeline is operated at design capacity. Objectionable surge, water hammer, unsteady delivery of water, damage to the pipeline, and detrimental discharge from control valves are evidence of malfunction.

MATERIALS

a. Appurtenances. Standard fittings shall be used for the pipe. Elbows, tees, crosses, reducers, gate valves, check valves, air-and-vacuum-release valves, pressure-relief valves, and pressure regulators shall be of the size and material specified or as shown on the drawings. Steel supports and saddles shall be constructed of material that equals or exceeds

the requirements specified in ASTM-A-36, "Structural Steel".

b. Pipe. Pipe shall equal or exceed the requirements specified in the following: American Water Works Association Designation C-200, "Steel Water Pipe 6 Inches and Larger"; ASTM-A-53, "Pipe, Steel, Black and Hot-Dipped, Zinc-Coated (Galvanized) Welded and Seamless for Ordinary Uses"; or ASTM-A-211, "Spiral-Welded Steel or Iron Pipe."

c. Interior Coating. If an interior coating is specified, the coating shall meet the requirements of one of the following:

The interior of the pipe shall be coated with a coal-tar primer followed by a hot coat of coal-tar enamel applied either manually or mechanically. All material and applications shall be in accordance with the requirements in American Water Works Association Specification C-203 pertaining to interior coatings.

Materials and workmanship shall be equal to those indicated in American Water Works Association Specification C-205.

Epoxy resin interior coatings shall meet the requirements given in this standard under the specifications for epoxy resin exterior coatings.

d. Exterior Coatings. Exterior coatings shall be Class A, Class B, or paint specified for the job.

If a Class A coating is required, the coating shall meet the requirements of one of the following:

The outside of the pipe shall be coated with a coal-tar primer followed by a hot coat of coal-tar enamel into which shall be bonded a felt wrapper and finished with a kraft paper or one coat of water-resistant whitewash. All materials and applications shall be in accordance with American Water Works Association Specification C-203.

Epoxy resin coatings shall have physical characteristics and be applied as follows:

- The pipe shall be cleaned of all contaminants such as lacquer, wax, coal-tar, asphalt, oil, or grease.
 - The pipe shall be shot blasted to white metal according to steel structure Painting Council Specification SSPC-SP5-63, using S-170 shot or equivalent.
 - After the pipe is blasted, the pipe surface shall be power wire brushed.
 - The coating shall be applied to the clean preheated (450 to 475 degrees F) pipe, using best commercial practice, to a minimum thickness of 7 mils. The thickness shall be determined by using a magnetic thickness gage. The heat source shall not leave residue on the pipe surface.
 - The coated pipe shall be maintained at or above 425 degrees F for a minimum of 20 seconds for full cure. At the end of this time, the pipe shall be water quenched before a support roller comes in contact with the coated surface.
 - All epoxy resin coated pipe shall be electrically inspected for holidays by using a wet electrode to apply 1,000 V, direct current, across the coating. All imperfections shall be repaired.
 - The epoxy resin coating shall meet the physical requirements of Class A cured epoxy resin coating indicated in **Table 1**.
- If a Class B coating is required, the coating shall meet the requirements of one of the following:
- The outside of the pipe shall be coated with coal-tar primer followed by a hot coat of coal-tar enamel and finished with a kraft paper or one coat of water-resistant whitewash. All materials and applications shall be according to American Water Works Association Specification C-203, except that the felt wrapper may be omitted.
 - The outside of the pipe shall be coated with a coal-tar primer followed by a hot coat of coal-tar enamel into which shall be bonded a felt wrapper and finished with a kraft paper or one coat of water-resistant whitewash. All

materials and applications shall meet the requirements in American Water Works Association Specification C-203, except that the minimum thickness of hot coal-tar enamel applied by pouring and spreading may be 1/32 in.

- All materials and workmanship shall meet the requirements in Federal Specification HHT-30a, August 2, 1967, Tape, Pipe Coating, Coal-Tar, Hot Applied, and Primer.

- The plastic tape coating shall be capable of withstanding the moisture and soil conditions to which it is to be subjected. All material shall be according to American Water Works Association Specification C-209 or to Interim Federal Specification L-T-001512 for Type I standard thickness tape, except that the tape coating may be of either rubber material or the specified plastic materials. Application shall be as follows:

- The surface of the pipe to be coated shall be cleansed of all foreign materials, such as oil, grease, dirt, mud. Any knurls, burrs, or other sharp points shall be removed by filing, peening, or wire brushing.

- The continuity of the applied plastic coating shall be of a quality that insures that all pipe, joints, and fittings can pass an

inspection test conducted with a spark discharge holiday detector at 1,500 V.

e. Paint. Paint shall meet the federal specifications detailed under "Installation."

f. Anodes. Zinc anodes must meet or exceed the requirements specified in ASTM-B-418, "Cast and Wrought Galvanic Zinc Anodes for use in Saline Electrolytes."

Each anode shall have a full length core with a single strand of insulated copper wire solidly attached to it. The wire shall be No. 12 or larger. If a header wire is used, the gage must be adequate to carry the design current with no more than a 20-mV I-R drop.

All anodes shall be commercially packaged. The packaged backfill mix shall be of the following proportions by weight.

Zinc - 20 to 30 percent bentonite; 70 to 80 percent gypsum

Magnesium - 20 to 25 percent bentonite; 70 to 75 percent gypsum; 5 percent sodium sulfate.

Table 1.-Requirements for Epoxy Coating

Test description	Procedure	Unit	Minimum test value
Impact	ASTM-G-14	in.-lb	120
Hardness	ASTM-D-2583	-	10
Adhesion	ASTM-D-1002	lb/in. ²	4,500
Disbonding cathodic	ASTM-G-8 (Method A)	-	(1)
Chemical resistance	ASTM-G-20	-	No visual effect
Thermal shock	320 ⁰ F (160 ⁰ C)	10 cycles	No visual effect
	to -80 ⁰ F (62 ⁰ C)		
	4 in. by 4 in.		
	coated panel ²		

¹No film failure (hydrogen gas at cathode or corrosion products of iron at anode) during first hour of testing. After 30 days, the maximum allowable equivalent circle diameter of the unsealed area must be 25.4 mm.

²Test at 320⁰ F for 30 min, then remove panel and immediately test at -80⁰ F for 15 min. The relative humidity of the laboratory room must be 50 percent when the sample is exposed.